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(54) WATER-BASED LUBRICANT COATING COMPOSITION

(57)Abstract:

PURPOSE: To obtain the title composition excellent in processability and rust- preventive properties.

CONSTITUTION: The composition comprises a water-dispersible ether ester type urethane resin (a) having a bisphenol skeleton, an ester skeleton and carboxyl groups and having an average molecular weight of 3000 or above, a water-soluble or waterdispersible epoxy resin (b), a polyolefin wax (c) having a melting point of 70-160°C and a mean particle diameter of 0.1-7.0µm and silica (d) having a mean particle diameter of 3-30mµm. The total amount of

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components (a) and (b) is 0.50:1-0.85:1 in terms of a ratio of the weight of the solid matter to the total solid matter content (e). The ratio of the weight of the solid matter of component (c) to (e) is 0.03:1-0.30:1. The ratio of the weight of the solid matter of component (d) to (e) is 0.10:1-0.40:1.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the drainage system lubricity paint constituent excellent in processability and rust prevention nature.

[0002]

[Description of the Prior Art] Conventionally, although the cold rolled sheet steel or the zinc system plating steel plate is used abundantly by processing assembly makers, such as household electric appliances, an automobile, and building materials, paint assembly is performed after fabricating operations, such as press forming, are performed not a little. There is what has an inadequate fabricating operation depending on a material, the lubricant which is the process of a fabricating operation and is represented by the press oil was applied, and the fabricating-operation nature made into the purpose is attained. However, when performing paint assembly after that, the applied lubricant must be a thing removable at a degreasing process.

[0003] In recent years, the steel plate which applied wax system lubricant to the board front face beforehand, without using a press oil is manufactured for the purpose of *****-izing, cost reduction, and a work-environment improvement. However, although wax system lubricant needs to be removed of the degreasing process of the following process and it is improved from the case of a press oil also about press environment, it cannot be said that it is good. For this reason, the functional surface treated steel sheet with the still more suitable lubricous side is developed. This steel plate is a surface treated steel sheet which the thin film of the constituent which made the lubricative good organic resin the principal component was not applied, and does not need the application of lubricant, such as a press oil, and a fabricating operation is possible and does not need a subsequent degreasing process and subsequent paint surface treatment.

[0004] as a Prior art in connection with this functional surface treated steel sheet, it is the technology currently indicated by (1) JP,63-25032,B, (2) JP,62-289274,A, (3) JP,61-227178,A, JP,61-227179,A, JP,61-231177,A, JP,61-279687,A, JP,62-33781,A, (4) JP,60-103185,A, (5) JP,63-83172,A, and (6) JP,2-124997,A, and outlines below

[0005] Although (1) is related with the lubricative paint film formation water-system constituent which makes a principal component organic-inorganic complex reactant which consists of water-soluble or water-dispersion an organic resin, an alkoxysilane compound, and a silica, and lubricant, since flexibility is inferior, even if the coat of organic-inorganic complex reactant contains a lubricous component, a coat does not follow high-velocity-forming processing, but lubricity is inadequate [the coat]. Although (2) is related with the coat layer which makes a principal component the quality of a composite or the quality of mixture of an urethane system resin and a silicon dioxide, in the coat of this component system, this invention persons have not attained the high lubricity made into the target. Although (3) has selected the inorganic solid lubricant of a graphite or molybdenum disulfide, or the mixed stock with a lubricating oil as lubricant, a dynamic friction coefficient is 0.1 or more, and is inadequate for a strong fabricating operation. Although the flexibility of the bisphenol A type epoxy

resin of the urethane denaturation which is a base resin although (4) is related with a two-layer chromate treatment steel plate improves greatly by urethane denaturation, it is inadequate for flexibility, even if it contains a lubricous component, a coat does not follow high-velocity-forming processing, but lubricity is inadequate. Although (5) is related with the constituent which blends the lubricative matter with the organic resin chosen from an epoxy resin, polyester resin, and acrylic resin, and the resin constituent which consists of a curing agent component, the processability of the fabricating operation of target intensity attained with this resin constituent base is [this invention persons] inadequate. A ground is double layer coat processing in which processing of a resin system is performed, and as for processability, although (6) is good, corrosion resistance is inferior to this invention in it. Moreover, since down stream processing is complicated, it differs from what is attained by one kind of coupling agent of this invention.

[0006]

[Problem(s) to be Solved by the Invention] What satisfies simultaneously both strong fabricating-operation nature and corrosion resistance is not obtained as shown in the outline of the aforementioned conventional technology. Moreover, a request that I want you to drainage-system-ize the processing agent of the solvent base is very strong because of the application work-environment improvement of a lubricative paint. this invention considers composition of a lubricative paint in order to solve these troubles, and it has strong fabricating-operation nature, i.e., the outstanding lubricity, and it offers the drainage system lubricity paint constituent for corrosion resistance, weldability, and the functional faceplates that were excellent chemical-resistant.

[0007]

[Means for Solving the Problem] About the drainage system lubricity paint constituent with which are simultaneously satisfied of the performance of the both sides of strong fabricating-operation nature and corrosion resistance, as a result of repeating research wholeheartedly, this invention persons find out that the following constituent demonstrates the aforementioned performance, and came to accomplish this invention. this invention has (a) bisphenol type frame, an ester frame, and a carboxyl group. average molecular weight Namely, 3000 or more water-dispersion ether ester type urethane resins, (b) A water-soluble or water-dispersion epoxy resin and the polyolefine wax whose mean particle diameter (c) melting point is 70-160 degrees C, and is 0.1-7.0 micrometers, and a solid-content weight ratio [as opposed to / contain the silica whose (d) mean particle diameter is 3-30mmum, and / a total solid (e) in the total quantity of (a) and (b)] -- 0.50:1 to 0.85:1 (a weight --) below the same -- it is -- the solid-content weight ratio to (e) of (c) -- 0.03:1 - the drainage system lubricity paint constituent characterized by being 0.30:1 and the solid-content weight ratio to (e) of (d) being 0.10:1 to 0.40:1 is offered

[0008] The composition of this invention is explained in detail below. The first feature of this invention is to combine the resin of a kind suitable as a base resin by the fixed weight ratio. It is necessary to make it as a resin the component which maintained adhesion, elongation, the shear strength, corrosion resistance, abrasion resistance, and chemical-resistant balance. In order to satisfy these performances, combination use of the resin of this invention is desirable. Although this invention persons had attained acquiring strong processability and corrosion resistance by already blending a urethane resin and an epoxy resin, and blending a specific wax, they found out demonstrating the especially excellent performance by specifying the structure of a urethane resin further wholeheartedly as a result of research.

[0009] In order to attain high processability and high corrosion resistance, a paint film is uniform, and it is a premise that adhesion is excellent and it is important that intensity and elongation can be balanced. It was easy to control physical properties more fundamental than the film made according to bridge formation of the resin of low molecular weight by using together a urethane resin with large molecular weight, and an epoxy resin, and the thin film of 0.3 - 6 g/m² also found out that uniform physical properties were easy to be acquired in the amount of paint films. In addition, the urethane resin of low molecular weight is the object of the kind containing the cross linking agent of various isocyanate systems. Especially the combination of the resin system which blended the epoxy resin which was excellent in improvement in the urethane resin excellent in with a molecular weight of 3000 or more

abrasion resistance, adhesion, or film intensity as a resin is a base resin suitable for demonstrating many properties, such as high processability and corrosion resistance.

[0010] The urethane resin of this invention is a water-dispersion ether ester type urethane resin (a) which molecular weight has a bisphenol type frame and an ester frame or more by 3000, and has a carboxyl group, and an epoxy resin (b) is a type which has a glycol frame or a bisphenol frame, and it is blended so that the reaction ratio (x) to the carboxyl group of (a) may become 20 - 100% (equivalent). Although the uniform membrane formation nature in a thin film is obtained by using the macromolecule urethane resin of this invention and the purpose of this invention is attained, if the resin with which the elongation of a paint film is 100% or more more preferably, and a tensile strength becomes two or more 100 kg/cm is applied, the highest high processability will be acquired.

[0011] Generally, since control of the physical properties of a urethane resin is performed by the balance and crosslinking density of a hard segment and a soft segment, an extensive property is controllable by the kind of the frame constituted and isocyanate. If the elongation of a urethane resin and the adjustment of a tensile strength which are used for this invention are controlled by the content of the ether frame which shows the ester frame which shows flexibility, and toughness, and the urethane-bond section and its latter content increases, although elongation is small, the tough property that a tensile strength is high will be acquired. In order to demonstrate especially excellent lubricating properties, the performance in which especially the thing in which a polyester frame and an ether component have a bisphenol frame excelled the polyester frame independent urethane resin which has a numeric value of the same grade as the resin physical properties of this invention is shown. Adhesion not only with the elongation and intensity of a resin but a base is easily guessed from it being a factor with big lubricity that what has a bisphenol frame is excellent in resin physical properties of the same grade at lubricating properties. The range of 1:9-7:3 (0.11:1 to 2.33:1) has the desirable weight ratio of a polyether frame and a polyester frame. Although it is tough when there are more ratios of a polyether than the above-mentioned range, since elongation is small, it is inferior to advanced fabricating-operation nature.

[0012] Although the urethane-resin system which made 3000 or more molecular weight macromolecule-ize the polyol of the ether and ester by the isocyanate carries out self-membrane formation by heating, it has a method of blending the epoxy resin which has reactant functional groups (a hydroxyl group, epoxy group, etc.) as a method of raising processability, chemical resistance, and corrosion resistance further as a paint film performance, carrying out heating bridge formation, and raising functionality. It newly found out that processability, corrosion resistance, and chemical-resistant large improvement could be aimed at from the denaturation object independent membrane formation method that this method performed epoxy denaturation of a urethane resin. Even if this crosslinking reaction blends an isocyanate compound or an amino compound etc. which was put together and which is called curing agent by the need although at least a resin system advances, it is not cared about.

[0013] Although a polyol, a polyoxy tetramethylene glycol, etc. which added an ethyleneoxide, propylene oxide, etc. to low-molecular glycols, such as ethylene glycol, a propylene glycol, and bisphenol A, are mentioned as a polyether polyol of the urethane-resin frame used for this invention, the polyether polyol which has especially the bisphenol A frame is suitable. The lactam polyols which carried out ring opening polymerization of the lactams, such as polyester obtained by the dehydration condensation reaction with low-molecular glycols and dibasic acid and an epsilon caprolactam, under existence of a low-molecular glycol as a polyester polyol are mentioned.

[0014] As an isocyanate machine which combines the ester frame and ether frame of a urethane resin The monomer of aromatic diisocyanate, such as TORIRE diisocyanate, diphenyl metadiisocyanate, and xylylene diisocyanate A reactant with a dimer, a trimer and them and a polyether polyol, a polyester polyol, etc., And the alicycle group isocyanate, isophorone diisocyanate which are those hydrogenation derivatives, Reactants with alicycle groups, such as hexamethylene di-isocyanate, and the monomer of an aliphatic isocyanate, a dimer, a trimer, a polyether polyol, a polyester polyol, etc. and those mixture can also be used. Although loadings are based on the polyester polyol to be used, a polyether polyol, and the molecular weight and the ratio of a carboxyl group introduction component which are mentioned later, 5 - 20% of the weight of a urethane resin can acquire the processability optimal as resin physical

properties by NCO conversion.

[0015] A carboxyl group carries out big contribution to adhesion with a surface of metal while being a functional group for carrying out self-emulsification. As an introductory component of a carboxyl group, it is a compound containing two or more hydroxyls or the amino group, and one or more carboxyl groups, and diamino carboxylic acids, such as dihydroxy carboxylic acids, such as 2 and 2-dimethylol propione acetic-acid, 2, and 2-dimethylol-propionic-acid, 2, and 2-dimethylol butanoic acid, 2, and 2-dimethylol pentanoic acid, and a lysine, an arginine, are mentioned. The carboxyl group compound chosen from these is macromolecule-ized with an isocyanate compound in combination with all [the aforementioned polyester] and a polyether polyol. The ether ester type urethane resin in which the molecular weight used by this invention has 3000 or more carboxyl groups by this method is made.

[0016] The method of neutralizing a carboxyl group with alkali, such as ammonia and a trimethylamine, and carrying out self-emulsification as a method of distributing the aforementioned urethane resin in water, or the method of carrying out emulsion distribution using an emulsifier is mentioned. It is most desirable to collect the solvents contained in the urethane manufacturing process before drainage-system-izing as a cure against a work environment, and to obtain a non-solvent type water dispersing element finally. It is suitable for the amount of a carboxyl group that it is 10-50 in the acid number per urethane solid content. The case of less than ten, adhesion is inadequate and processability and corrosion resistance are inferior. When exceeding 50, since water resistance and alkali resistance are inferior, corrosion resistance falls.

[0017] As loadings of the epoxy resin which has reactant functional groups (a hydroxyl group, epoxy group, etc.), it is preferably appropriate to blend so that the reaction ratio (x) to the carboxyl group in the urethane resin of the epoxy group in an epoxy resin may become 20 - 100% (equivalent). At less than 20%, a blending effect is deficient in x, and in the amount exceeding 100%, since an epoxy resin serves as a plasticizer-role, advanced processability falls. In addition, chemical resistance and the anti-corrosion disposition top effect of an epoxy resin are large. When the object of the structure of having the bisphenol A type frame is used for an epoxy resin, adhesion and especially the anti-corrosion disposition top effect are large. Since a non-solvent type and paint film degradation are prevented as an environmental cure, when a non-emulsifier type is required, a water-soluble epoxy resin can be obtained by giving a hydrophilic property by the glycol frame.

[0018] It is necessary to determine the loadings of an epoxy resin according to the acid number of a urethane resin, and the calculation method is as follows. The formula which calculated the initial complement of the epoxy resin for carrying out 100% of reaction from the urethane resin which has the predetermined acid number (AV) is the following formula noting that the carboxyl group of a urethane resin and the epoxy group of an epoxy resin react with the equivalent.

[0019]

[Equation 1]

エポキシ固形分重量 (g)

1/56

= ウレタン樹脂の A V 値 × ——— エポキシ当量 × ウレタン樹脂配合重量

1000

(g)

[0020] Although the reactional phase present becomes that the carboxyl group which contributes to adhesion does not have less in order that the epoxy group blended by this invention may construct a bridge with a carboxyl group, since OH basis arises by the ring breakage of an epoxy group, adhesion is secured. Moreover, corrosion resistance also improves greatly by combination of an epoxy resin. Molecular weight is stabilized in the combination of less than 3000 urethane resin and the above-mentioned epoxy resin, and high processability is not attained. Moreover, in membrane formation urethane-resin independent [with a molecular weight of 3000 or more], advanced processability and advanced corrosion resistance are not acquired.

[0021] The range of 0.50:1 to 0.85:1 is suitable for the sum total weight of the urethane resin (a) of the drainage system lubricous paint constituent of this invention, and an epoxy resin (b) at the solid-content ratio $[(a+b)/e]$ to a total solid (e). When a ratio exceeds less than 0.50 and 0.85, corrosion resistance and processability are inadequate.

[0022] However, only by these resin system coats, since the target processability cannot be attained, combined use of a lubricous additive is needed. As a lubricous additive, lubricant, such as a well-known fluorine system, a hydrocarbon system, a fatty-acid amide system, an ester system, an alcoholic system, a metallic-soap system, and an inorganic system, is mentioned. It is required from the point that choosing matter which exists in a resin film front face reduces the front face of a molding work, and friction of metal mold rather than existing in the resin film which the added lubricant formed as a selection criterion of the lubricous additive for the improvement in processability dispersedly, and it carries out the maximum exertion of the lubricous effect. That is, when it exists in the resin film which lubricant formed dispersedly, a skin friction coefficient produces the poor appearance and the processability fall which the quality of a powdered material carries out exfoliation deposition, and are called powdering phenomenon that a resin film is easy to be destroyed highly. As matter which exists in a resin film front face, it does not dissolve in a resin and the small thing of surface energy is chosen.

[0023] When the melting point used the polyolefine wax whose mean particle diameter is 0.1-7.0 micrometers at 70-160 degrees C as a result of this invention persons' examination, it turns out that processability improves greatly and performances, such as corrosion resistance after processing and chemical resistance, are also made good. As this wax, the wax of hydrocarbon systems, such as paraffin, a micro crystalline, or polyethylene, is mentioned. Since coat temperature rises with the heat by deformation and the frictional heat of a material, at the time of a fabricating operation, 70-160 degrees C is suitable for the melting point of a wax, and the property which the melting point carried out softening fusion and was excellent in less than 70 degrees C as a solid lubrication additive at the time of processing is not demonstrated at it. Moreover, since a stiff particle will exist in a front face and the thing of the melting point exceeding 160 degrees C reduces a friction property, advanced fabricating-operation nature is not obtained.

[0024] Preferably, as saponification value of a polyolefine wax, it is 30 or less and 0, and processability with advanced using the thing of low density which has branching structure can be acquired. Since it is easy to dissolve polarity in a resin greatly and that to which saponification value exceeds 30 stops being able to exist in a resin front face easily at the time of membrane formation, when advanced processability ability level is required, it cannot be said to be suitable. The saponification value in which especially a desirable thing does not have a smaller ester combination of compatibility with a resin is the wax of 0.

[0025] 0.1-7.0 micrometers is suitable for the mean particle diameter of these waxes. Since a distribution of the wax which solidified becomes uneven, that to which a mean particle diameter exceeds 7.0 micrometers is not desirable. Moreover, in the case of less than 0.1 micrometers, processability is inadequate. The amount of a lubricous additive (c) is added 0.03:1 to 0.30:1 time by the solid-content ratio to the total-solid weight (e) of a lubricative paint constituent. When a ratio is less than 0.03, the improvement effect in processability is small and processability and corrosion resistance fall in the amount exceeding 0.30. It is more desirable in order for the thing of a true spherical to acquire advanced processability as a configuration of a wax particle.

[0026] As other additives, a silica (c) is added 0.10:1 to 0.40:1 time by the ratio to a total solid (e) for improvement in corrosion resistance. By addition of a silica (SiO_2), there are corrosion resistance large improvement and the improvement effect of processability. Less than 10% of case, the improvement effect of corrosion resistance and processability is small, and in the amount exceeding 40%, since the elongation and intensity of a resin fall while the binder effect of a resin becomes small and corrosion resistance falls, processability falls. About the mean particle diameter of a silica, 3-30mmicro is suitable. When a mean particle diameter exceeds 30 micrometers, in the case of below 30mmicro, more advanced processability and more advanced corrosion resistance are not acquired. As a kind of silica, although there are liquid phase colloidal silica and a gaseous-phase silica, it does not limit especially by this

invention. Moreover, for the reason on the conductive matter or a design disposition, a color pigment may be added for improvement in weldability. Moreover, various additives, such as a sedimentation inhibitor, a leveling agent, and a thickener, can also be added.

[0027] Since this invention is the paint of a drainage system, when performing a specified quantity application to the painted surface-ed, since surface tension is high as compared with a solvent system, surface wettability is inferior, and uniform application nature may not be obtained. In order to secure performances, such as advanced processability and corrosion resistance, it is indispensable that a uniform application is performed to *****-ed. For this reason, it is well-known to carry out combination addition of a wetting agent or the thickener. The surfactant to which well-known surface tension, such as a fluorine system in which surface tension is reduced, and a silicon system, is reduced as a wetting agent is mentioned. In this invention, especially the thing that the number of mols of an addition ethyleneoxide does 0.05-0.5% (weight) to a drainage system lubricous paint constituent for content of 20 or less and the acetylene glycol alcohol type surfactant (f) of 0 in these compounds found out the desirable thing. The improvement effect in wettability is saturated with the amount with which the addition effect of loadings is small with an amount and they exceed 0.5% at less than 0.05%. In addition, it is the feature that an acetylene glycol alcohol type surfactant is damp, and speed has the defoaming effect simultaneously greatly. On the other hand, since the surfactant of a fluorine system and a silicon system is damp although surface tension fall capacity is excellent, and speed is small, and it is inferior to antifoam and finishing paint adhesion is also inferior, it is not suitable.

[0028] Moreover, a thickener (g) may be added as a cure in case film thickness is not secured by the method of application represented by the roll coater, when surface coating nature sufficient by just the wetting agent cannot be secured to the crawling part of the painted surface-ed. Usually, since the paint of this invention is applied to a coated object at high speed, on the coating conditions which receive high-speed shearing stress in the thickener of the CHIKUSO type represented by the cellulose system, its effect is small. On such coating conditions, it is well-known that a new TONIA type thickener is suitable. As a thickener used for this invention, especially the thickener in which molecular weight has the ether urethane frame of 1000-20000 is desirable. Since this thickener has the urethane-resin frame and compatibility which are the base resin of this invention paint, it shows the new TONIA thickening behavior of meeting nature, and it shows an effective effect with a little addition. Usually, although an original performance is reduced in many cases when blending an additive with a paint, it is the feature that this thickener has the very small influence of [at the time of remaining in a paint film for the frame to which hydrolysis cannot take place easily]. To the resin solid content of a drainage system lubricity paint constituent, an addition is 0.01 - 0.2% (weight), and is usually determined by coating conditions. At less than 0.01%, the thickening effect has small loadings, and since that trouble arises to coating nature since viscosity becomes large too much in the amount exceeding 0.2% and advanced processability, and the outstanding corrosion resistance fall, it is not desirable.

[0029] As for the material which applies the aforementioned lubricative paint constituent, a cold rolled sheet steel or a zinc system plating steel plate is mentioned. Moreover, in order to raise corrosion resistance more, it is effective to perform surface treatment, and well-known chromate treatment or phosphoric-acid zinc processing is appropriate in this case. It is desirable to apply the lubricative paint concerned, to consider performances, such as processability, corrosion resistance, and weldability, and to make the coat of 0.3 - 6 g/m² form on these ground coats.

[0030]

[Example] Hereafter, the example of this invention is given with the example of comparison, and this invention is explained concretely.

1. Board thickness of creation (1-1) test-specimen marketing of a test piece = the 0.8mm double-sided electrolytic zinc-coated carbon steel sheet (EG; amount of superintendent officers = 20/20 (g/m²)) was used as a test specimen.

(1-2) Degreasing processing was carried out for the degreasing processing test specimen with the fine cleaner 4336 (Nihon Parkerizing Co., Ltd. make) of a silicate system alkaline-degreasing agent.

(Concentration = 20g/l, temperature = 60 degree C, 2-minute spray)

(1-3-1) Spray processing was carried out by zinc ROM 3367 (Nihon Parkerizing Co., Ltd. make), and ground chromate treatment chromate-film formation was dried for 10 seconds after rinsing by 220-degree C ambient temperature (steel plate attainment board temperature = 100 degree C). Chromium coating weight is 50 mg/m².

(1-3-2) With the PAL bond L3020 (Nihon Parkerizing Co., Ltd. make), ground phosphoric-acid zinc processing phosphoric-acid zinc coat formation performed immersing processing, and air-dried it after rinsing. A coat weight is 1.9 g/m².

(1-4) The lubricative paint constituent shown in the application table 1 of a lubricative paint constituent was applied by the bar coating machine, and it dried for 30 seconds by 260-degree C ambient temperature (steel plate attainment board temperature = 160 degree C).

[0031] 2. As a paint board performance test (2-1) processability standard, the blank board of the diameter of 115mmphi was used and the high-speed cupping test was carried out the condition for diameter of punch = 50mmphi, ***** = 3.0TON, and deep-drawing speed = 30m/. The marginal contraction ratio at this time is 2.30. in addition, the case of a drawing omission -- every [5mmphi] -- it is the thing of the large diameter of blank, and examined

<Error criterion> O = it extracted and escaped, the contraction ratio extracted and escaped also from 2.40, and it O = Extracted and escaped, the body **[coat-damage-less] = Extracted and it escaped, and the body x[with coat damage] = Extracted, and it did not escape, but the salt spray test by corrosion-resistant (2-2) JIS-Z2731 was performed for 400 hours, and the white-rust generating situation was observed.

<Error criterion> O = rust generating is a whole surface product. Less than 3%O = rust generating is a whole surface product. 10% or more less than 30%x = rust generating of a whole surface product performed chemical-resistant 30% or more (2-3) solvent resistance or an alkali-proof examination of a whole surface product, and 3% or more less than 10%** = rust generating performed the corrosion resistance aforementioned evaluation. a resistance to solvents test -- a trichlene steam -- being immersed during 3 minutes, and an alkali-proof examination -- silicate system alkaline-degreasing agent = -- 60 degrees C is immersed 20 g/l for 5 minutes

<Error criterion> O = rust generating is a whole surface product. Less than 3%O = rust generating is a whole surface product. In 10% or more of a whole surface product, 3% or more less than 10%** = rust generating is 10% or more of a whole surface product, and performance-degradation-less x = rust generating is those with performance degradation. [0032] 3. Dry it on it after applying the sample offering lubricous paint constituent of Table 2 to the front face which performed chromate treatment to the electrolytic zinc-coated carbon steel sheet on the creation conditions of the coating nature evaluation test aforementioned test panel by the bar coating machine so that it may become the amount of paint films of 1 g/m², and viewing estimates the uniform covering nature of a paint film on it.

<Error criterion> O = or it is uniform and the line pattern of an or less [3 //m] 2O = bar is thinly accepted for the number of pinholes, and the line pattern of a 4-10-piece [/m] 2** = bar is deeply accepted for the number of pinholes, the number of pinholes is two or more [11 //m]. [0033] 4. A level list of a sample offering lubricity paint constituent is shown in a component list of a lubricative paint constituent and Table -2, and a performance result list is shown in the test-result table -1 in Table -3, and explain an example and the example of comparison. After No.1-17 make a clo mate or a phosphate coat form in a zinc system plating steel plate, they are the example in which dried after applying the lubricative paint constituent of this invention, and the coat was made to form, and each of each performances of processability, corrosion resistance, chemical resistance, and coating nature is good in Table -3. The example of comparison of the performance using the lubricative paint constituent with which No.18-32 differ from this invention in Table -3 is inadequate.

[0034]

[Effect of the Invention] The coat formed with the lubricative paint constituent of this invention, using together the elongation, the intensity and the adhesion, the antiwear characteristic, and the epoxy resin of the urethane resin which has an ether ester frame -- corrosion resistance, chemical resistance, and processability -- improving -- an operation of the lubricating-properties effect of a specific wax, and the

large corrosion resistance and the improvement effect in processability of a silica (SiO₂) -- strong fabricating-operation nature -- that is, it has the outstanding lubricity and it has corrosion resistance, weldability, resistance to contamination, and the property that was excellent chemical-resistant For this reason, the purpose of *****-izing, cost reduction, and a work-environment improvement is attained.

[0035]

[Table 1]

表-1 潤滑性塗料組成物の成分

1-1) ウレタン樹脂 (a)

	A	B	C	D	特許請求範囲
平均分子量	5000	60000	30000	40000	→ 3000以上
エーテル:エステル (固形分重量比)	0.32:1	0.92:1	0.03:1	6.14:1	→ 0.11:1~ 2.33:1
エーテルのタイプ ^o	ビスフェノールA	ビスフェノールA	ビスフェノールA	ビスフェノールA	
酸価	18	32	26	17	→ 10~50
イソシアネート含有量 (NCO換算重量%)	8	11	9	9	
分散液固形分濃度 (%)	32	30	30	31	

	E	F	G	H
平均分子量	1500	80000	70000	50000
エーテル:エステル (固形分重量比)	0.47:1	0.22:1	0.30:1	0.27:1
エーテルのタイプ ^o	ビスフェノールA	ビスフェノールA	ビスフェノールA	エチレングリコール
酸価	22	4	67	32
イソシアネート含有量 (NCO換算重量%)	15	8	16	11
分散液固形分濃度 (%)	35	30	30	32

	I	J
平均分子量	4500	65000
エーテル:エステル (固形分重量比)	0.54:1	0:1
エーテルのタイプ ^o	プロピレングリコール	-
酸価	28	25
イソシアネート含有量 (NCO換算重量%)	11	10
分散液固形分濃度 (%)	30	35

1-2) エポキシ樹脂 (b)

	K	L	M
骨格	ビスフェノールA	プロピレングリコール	ウレタン変性
エポキシ当量	450	220	800
水分散方法	強制乳化	水溶性	強制乳化
分散液固形分濃度 (%)	40	100	50

[0036]

[Table 2]

1-3) 他の樹脂

	N	O	P	Q
タイプ	エチレンアクリル	スチレンアクリル	ウレタン変性 アクリル	ポリエステル
酸価	40	35	20	45
分散液固形分濃度 (%)	30	30	40	30

1-4) 潤滑添加物 (c)

	イ	ロ	ハ	ニ
骨格	低密度 ポリエチレン	高密度 ポリエチレン	ポリプロピレン	マイクロクリスタリン ワックス
酸化価	0	3	0	10
平均粒径 (μm)	1.0	3.0	2.0	4.0
比重	0.92	0.97	0.90	0.88
融点 ($^{\circ}\text{C}$)	115	120	150	89
分散液固形分濃度 (%)	35	35	40	40

特許請求範囲

→ 30以下、0

→ 0.1~7.0

→ 70~160

	ホ	ヘ	ト	チ
骨格	低密度 ポリエチレン	高密度 ポリエチレン	部分酸化 パラフィンワックス	PTFE
酸化価	50	0	15	0
平均粒径 (μm)	0.6	10	2.0	0.3
比重	0.92	0.97	0.86	2.1
融点 ($^{\circ}\text{C}$)	112	118	50	327
分散液固形分濃度 (%)	40	35	40	55

1-5) シリカ (d)

	リ	ヌ	ル	オ
タイプ	液相コロイド*	液相コロイド*	気相	液相コロイド*
平均粒径 (μm)	20	5	12	40
分散液固形分濃度 (%)	20	20	10	20

特許請求範囲

→ 3~30

[0037]

[Table 3]

1-6) その他添加物 (界面活性剤)

	ワ	カ	ヨ
タイプ	アセチレングリコールアルコール	フッ素系界面活性剤	高級アルコール界面活性剤
付加EO平均モル数	3.5	-	8
表面張力(0.1%) (dyne/cm)	10.5	18.6	27.5
分散液固形分濃度 (%)	100	30	100

1-7) その他添加物 (増粘剤)

	タ	レ	ソ
タイプ	アルキレングリコールウレタン変性	ポリエーテルホリウレタン	カルボキシルメチルセルロース
分子量	8000	10000	180000
分散液固形分濃度 (%)	10	20	10

[0038]

[Table 4]

表-2 供試潤滑性塗料組成物の水準

2-1) 実施例の組成

		水系潤滑性塗料組成物中の固形分組成 ※1							※2 反応 比率	
		樹脂				潤滑 添加物	シリカ	その他添加物		
		ウレタン (a)	イポキシ (b)	その他	固形分 比小計 $\frac{a+b}{e}$			活性剤 (f)	増粘剤 (g)	(x) (%)
実施例	1	A (0.60)	K (0.07)	—	(0.67)	イ (0.08)	リ (0.25)	—	—	80.7
	2	A (0.66)	L (0.04)	—	(0.70)	ロ (0.10)	ル (0.20)	—	—	85.7
	3	B (0.52)	L (0.10)	—	(0.62)	イ (0.20)	リ (0.18)	—	—	153
	4	B (0.45)	M (0.10)	—	(0.55)	ハ (0.15)	ヌ (0.30)	—	—	48.6
	5	B (0.65)	K (0.10)	—	(0.75)	ニ (0.10)	リ (0.15)	ワ (0.2)	—	59.8
	6	A (0.65)	M (0.05)	—	(0.70)	ロ (0.05)	ル (0.25)	—	タ (0.04)	29.9
	7	A (0.65)	K (0.05)	—	(0.70)	イ (0.10)	ヌ (0.20)	—	レ (0.08)	53.2
	8	A (0.65)	K (0.05)	—	(0.70)	ホ (0.10)	リ (0.20)	—	—	53.2
	9	B (0.64)	L (0.06)	—	(0.70)	ヘ (0.15)	リ (0.15)	—	—	74.6
	10	A (0.62)	K (0.08)	—	(0.70)	イ (0.10)	ヌ (0.20)	カ (0.08)	—	89.2
	11	B (0.60)	K (0.10)	—	(0.70)	ロ (0.08)	リ (0.22)	ヨ (0.3)	—	64.8
	12	B (0.57)	K (0.08)	—	(0.65)	ハ (0.15)	ヌ (0.20)	—	ソ (0.2)	54.6
	13	C (0.57)	K (0.08)	—	(0.65)	イ (0.10)	ヌ (0.25)	—	—	67.2
	14	D (0.60)	K (0.10)	—	(0.70)	イ (0.15)	リ (0.15)	—	—	122
	15	F (0.73)	L (0.02)	—	(0.75)	ニ (0.10)	ル (0.15)	—	—	174
	16	G (0.50)	L (0.10)	—	(0.60)	ハ (0.10)	ヌ (0.15)	—	—	76.0
固形分比 請求範囲		—	—	—	0.50 ~0.85	0.03 ~0.30	0.10 ~0.40	—	—	—

※1 ()の数値は、全固形分(e)に対する配合固形分重量比

但し、その他添加物は潤滑性塗料組成物全体に対する含有重量%

※2 イポキシ樹脂中のイポキシ基のウレタン樹脂中のイポキシ基に対する反応比率(当量%)

[0039]

[Table 5]

2-2) 比較例の組成

		水系潤滑性塗料組成物中の固形分組成 ※1								※2
		樹脂				潤滑 添加物 (c)	シリカ (d)	その他添加物		反応 比率 (x) (%)
		ウレタン (a)	エポキシ (b)	その他	固形分 比小計 $\frac{a+b}{e}$			活性剤 (f)	増粘剤 (g)	
比較 例	17	E (0.60)	K (0.10)	—	(0.70)	ハ (0.15)	ル (0.15)	—	—	94.2
	18	H (0.45)	M (0.10)	—	(0.55)	イ (0.15)	リ (0.30)	—	—	48.6
	19	I (0.50)	M (0.10)	—	(0.60)	ロ (0.15)	ヌ (0.25)	—	—	50.0
	20	J (0.55)	M (0.15)	—	(0.70)	ハ (0.10)	リ (0.20)	—	—	76.4
	21	A (0.60)	—	—	(0.60)	イ (0.15)	リ (0.25)	—	—	0.0
	22	—	K (0.10)	N (0.55)	—	ロ (0.10)	ヌ (0.25)	—	—	—
	23	—	K (0.10)	O (0.55)	—	イ (0.15)	リ (0.20)	—	—	—
	24	—	L (0.05)	P (0.65)	—	ロ (0.10)	ル (0.20)	—	—	—
	25	—	—	Q (0.60)	—	イ (0.15)	リ (0.25)	—	—	—
	26	A (0.50)	M (0.10)	—	(0.60)	ト (0.10)	ル (0.30)	—	—	77.8
	27	B (0.55)	K (0.10)	—	(0.65)	チ (0.10)	リ (0.25)	—	—	70.7
	28	A (0.55)	M (0.15)	—	(0.70)	ロ (0.10)	オ (0.20)	—	—	106.1
	29	A (0.35)	K (0.05)	—	(0.40)	イ (0.25)	リ (0.35)	—	—	98.8
	30	A (0.55)	L (0.05)	—	(0.60)	ハ (0.35)	リ (0.10)	—	—	141
	31	B (0.48)	K (0.05)	—	(0.53)	ロ (0.04)	ル (0.43)	—	—	40.5
固形分比 請求範囲		—	—	—	0.50 ～0.85	0.03 ～0.30	0.10 ～0.40	—	—	—

※1 ()の数値は、全固形分(e)に対する配合固形分重量比

但し、その他添加物は潤滑性塗料全体に対する含有重量%

※2 イソキ樹脂中のイソキシ基のウレタン樹脂中のカルボキシル基に対する反応比率(当量%)

[0040]

[Table 6]

表-3 性能一覧表

		素材	下地皮膜		塗料組成物		塗装板性能			塗工性
		種類	付着量 (g/m ²)	種類	種類	塗布量 (g/m ²)	加工性	耐食性	耐薬品性	
実 施 例	1	EG	0.06	ケムート	1	1.0	◎	◎	◎	○
	2	↑	↑	↑	2	↑	◎	◎	◎	○
	3	↑	↑	↑	3	↑	○	◎	◎	○
	4	↑	↑	↑	4	↑	◎	◎	◎	○
	5	↑	↑	↑	5	↑	◎	◎	◎	◎
	6	↑	↑	↑	6	↑	◎	◎	◎	◎
	7	↑	↑	↑	7	↑	◎	◎	◎	◎
	8	↑	↑	↑	8	↑	○	○	○	○
	9	↑	↑	↑	9	↑	○	○	○	○
	10	↑	↑	↑	10	↑	◎	○	○	○
	11	↑	↑	↑	11	↑	◎	○	○	○
	12	↑	↑	↑	12	↑	◎	○	○	○
	13	↑	↑	↑	13	↑	○	○	○	○
	14	↑	↑	↑	14	↑	○	◎	◎	○
	15	↑	↑	↑	15	↑	○	○	○	○
	16	↑	↑	↑	16	↑	◎	◎	○	○
	17	↑	1.90	リソ酸塩	1	↑	◎	○	○	○
比 較 例	18	EG	0.06	ケムート	17	↑	×	△	△	○
	19	↑	↑	↑	18	↑	○	△	△	○
	20	↑	↑	↑	19	↑	△	×	×	○
	21	↑	↑	↑	20	↑	△	×	×	○
	22	↑	↑	↑	21	↑	△	△	×	○
	23	↑	↑	↑	22	↑	△	△	×	○
	24	↑	↑	↑	23	↑	×	×	×	○
	25	↑	↑	↑	24	↑	△	△	×	○
	26	↑	↑	↑	25	↑	×	△	×	○
	27	↑	↑	↑	26	↑	△	○	○	○
	28	↑	↑	↑	27	↑	×	○	○	○
	29	↑	↑	↑	28	↑	△	△	△	○
	30	↑	↑	↑	29	↑	△	△	△	○
	31	↑	↑	↑	30	↑	△	△	△	○
	32	↑	↑	↑	31	↑	×	△	△	○

[Translation done.]